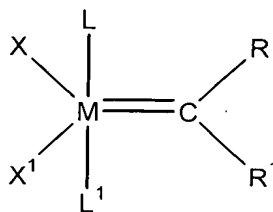


WHAT IS CLAIMED IS:

1. A process for the preparation of a, optionally hydrogenated, nitrile rubber comprising the steps of
- 5 a) reacting a nitrile rubber in the absence of any co-olefin and in the presence of at least one compound selected from the group consisting of compounds of the general formulas I, II, III or IV,



Formula I

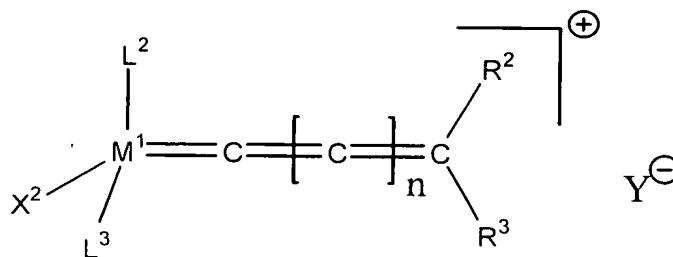
10 wherein:

M is Os or Ru,

R and R¹ are, independently, hydrogen or a hydrocarbon selected from the group consisting of C₂-C₂₀ alkenyl, C₂-C₂₀ alkynyl, C₁-C₂₀ alkyl, aryl, C₁-C₂₀ carboxylate, C₁-C₂₀ alkoxy, C₂-C₂₀ alkenyloxy, C₂-C₂₀ alkynyloxy, 15 aryloxy, C₂-C₂₀ alkoxycarbonyl, C₁-C₂₀ alkylthio, C₁-C₂₀ alkylsulfonyl and C₁-C₂₀ alkylsulfinyl,

X and X¹ are independently any anionic ligand,

20 L and L¹ are, independently any neutral ligand, optionally, L and L¹ can be linked to one another to form a bidentate neutral ligand;

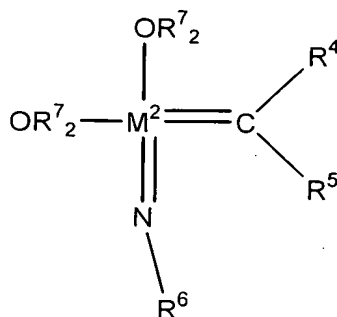


Formula II

wherein:

M^1 is Os or Ru;

5 R^2 and R^3 are, independently, hydrogen or a hydrocarbon selected from the group consisting of C_2 - C_{20} alkenyl, C_2 - C_{20} alkynyl, C_1 - C_{20} alkyl, aryl, C_1 - C_{20} carboxylate, C_1 - C_{20} alkoxy, C_2 - C_{20} alkenyloxy, C_2 - C_{20} alkynyloxy, aryloxy, C_2 - C_{20} alkoxycarbonyl, C_1 - C_{20} alkylthio, C_1 -
 10 C_{20} alkylsulfonyl and C_1 - C_{20} alkylsulfinyl, X^2 is a anionic ligand, and L^2 is a neutral mono- or polycyclic π -bonded ligand, L^3 is a ligand selected from the group consisting of phosphines, sulfonated phosphines, fluorinated
 15 phosphines, functionalized phosphines bearing up to three aminoalkyl-, ammoniumalkyl-, alkoxyalkyl-, alkoxycarbonylalkyl-, hydroxycarbonylalkyl-, hydroxyalkyl- or ketoalkyl- groups, phosphites, phosphinites, phosphonites, phosphinamines, arsines, stibenes, ethers, amines, amides, imines, sulfoxides,
 20 thioethers and pyridines, Y^- is a non-coordinating anion, n is an integer in the range of from 0 to 5,



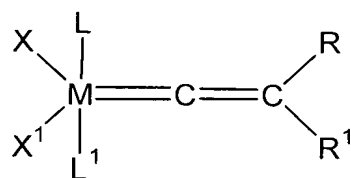
Formula III

wherein

M^2 is Mo or W,

R^4 , R^5 are, independently, hydrogen or a hydrocarbon selected from the group consisting of C_2 - C_{20} alkenyl, C_2 - C_{20} alkynyl, C_1 - C_{20} alkyl, aryl, C_1 - C_{20} carboxylate, C_1 - C_{20} alkoxy, C_2 - C_{20} alkenyloxy, C_2 - C_{20} alkynyloxy, aryloxy, C_2 - C_{20} alkoxycarbonyl, C_1 - C_{20} alkylthio, C_1 - C_{20} alkylsulfonyl and C_1 - C_{20} alkylsulfinyl;

R^6 and R^7 are independently selected from any unsubstituted or halo-substituted alkyl, aryl, aralkyl groups or silicon-containing analogs thereof,



Formula IV

wherein

M is Os or Ru,

R and R^1 are independently selected from the group consisting of hydrogen, substituted or unsubstituted alkyl, and substituted or unsubstituted alkyl

X and X^1 are independently any anionic ligand, and

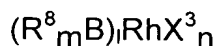
L and L^1 are independently any neutral ligand;

and optionally

b) hydrogenating the product of step a).

- 5 2. A process according to Claim 1 wherein the hydrogenation is performed under homogeneous catalytic conditions.
3. A process according to Claim 2 wherein the homogeneous catalytic reduction is carried out *in situ* without first isolating the product of
- 10 step a).
4. A process according to Claim 1 wherein no further hydrogenation catalyst is added before or during step b).
- 15 5. A process according to Claim 1, wherein the metathesis catalyst is a compound of Formula I wherein L and L¹ are independently selected from the group consisting of trialkylphosphines, imidazolidinylidenes or imidazolidines.
- 20 6. A process according to Claim 5 wherein either L or L¹ is a trialkylphosphine and the remaining ligand is a imidazolidinylidenes, X and X¹ are chloride ions and M is ruthenium.
7. A process according to Claim 6 wherein the ratio of compound to
- 25 nitrile rubber is in the range of from 0.005 to 5.
8. A process according to Claim 7, wherein the process is carried out in an inert solvent selected from the group consisting of monochlorobenzene, dichloromethane, benzene, toluene, tetra-
- 30 hydrofuran and cyclohexane.

- 9.. A process according to Claim 1, wherein the hydrogenation is carried out using a catalyst of formula:



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wherein each R^8 is independently selected from the group consisting of a C_1 - C_8 -alkyl group, a C_4 - C_8 -cycloalkyl group, a C_6 - C_{15} -aryl group and a C_7 - C_{15} -aralkyl group; B is selected from the group consisting of phosphorus, arsenic, sulfur, and a sulphoxide group ($S=O$); X^3 is selected from the group consisting of hydrogen and an anion; and l is 2, 3 or 4, m is 2 or 3 and n is 1, 2 or 3.

10

- 15 10. A process according to Claim 9 wherein the hydrogenation catalyst is $(PPh_3)_3RhCl$.

11. An, optionally hydrogenated, nitrile rubber having a molecular weight (M_w) in the range of from 20,000 to 250,000, a Mooney viscosity (ML 1+4 @ 100 deg. C) of in the range of from 1 to 50, and a MWD (or polydispersity index) of less than 2.5.

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12. A polymer composite comprising at least one, optionally hydrogenated, nitrile rubber polymer having a Mooney viscosity (ML 1+4 @ 100°C) in the range of from 50-30, at least one filler and optionally at least one cross-linking agent.

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13. A polymer composite according to Claim 12 wherein the raw polymer Mooney viscosity (ML 1+4 @ 100°C) is below 50.

14. A polymer composite according to Claim 12 wherein the polymer composite further comprises a peroxide system.
- 5 15. A process for preparing a polymer composite according to Claim 12 comprising reacting at least one, optionally hydrogenated, nitrile rubber polymer having a Mooney viscosity (ML 1+4 @ 100°C) in the range of from 50-30, at least one filler and optionally at least one cross-linking agent.
- 10 16. A process for the manufacture of a shaped article comprising the step of injection molding a polymer composite comprising at least one, optionally hydrogenated, nitrile rubber polymer having a Mooney viscosity (ML 1+4 @ 100°C) in the range of from 50-30, at least one filler and at least one cross-linking agent.
- 15 17. A process according to Claim 16, wherein the shaped article is seal, hose, bearing pad, stator, well head seal, valve plate, cable sheathing, wheel, roller, in place gaskets or pipe seal.